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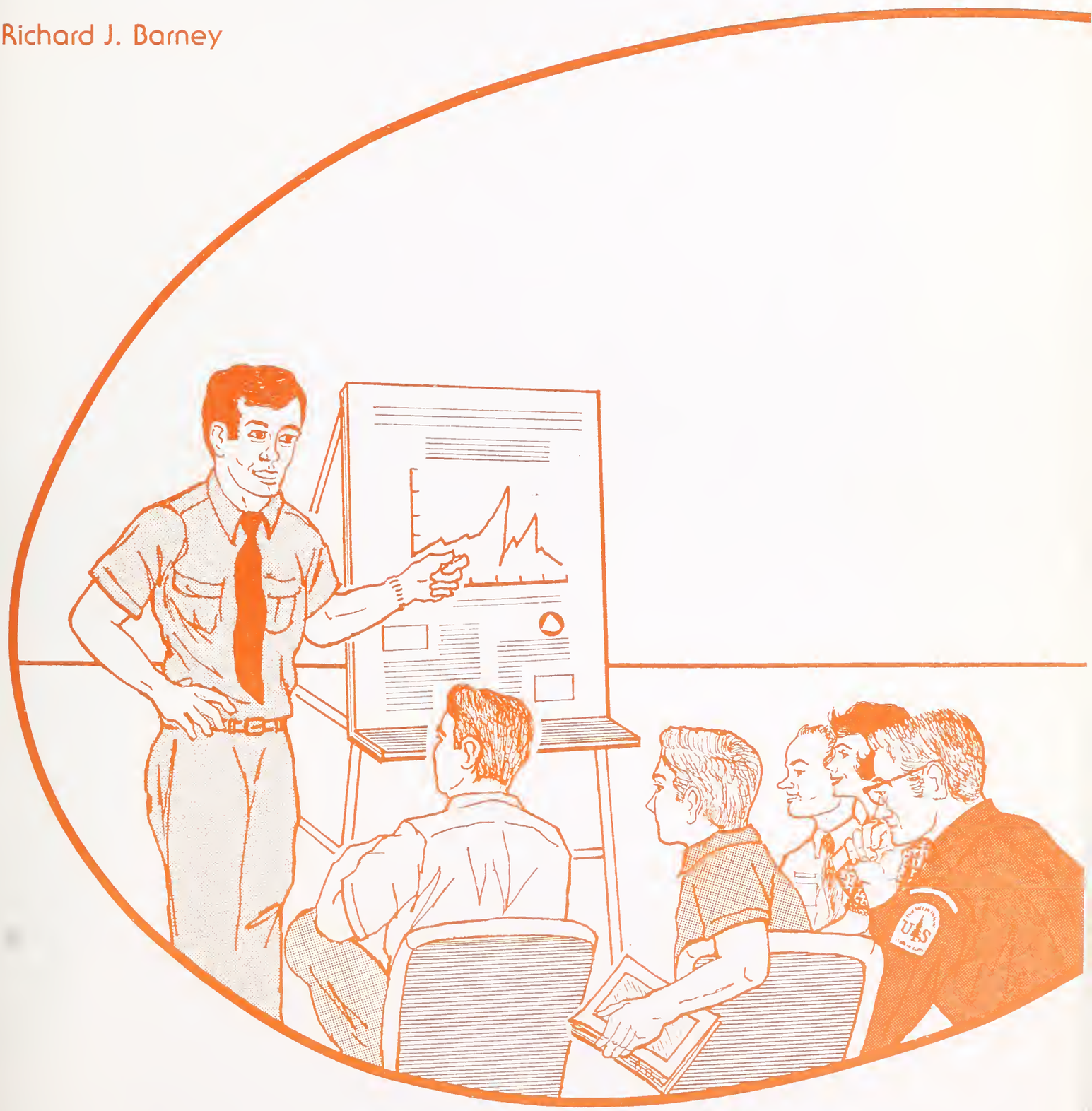
FOREST SERVICE MANAGERS' VIEWS

Richard J. Barney



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RICHARD J. BARNEY received his bachelor's degree in 1958, his master's degree in 1961 from the University of Montana and his Ph.D. from Michigan State University in 1976, all in forestry. From 1958-1961 he worked on the Flathead National Forest. During the period 1961-1965 he was located at the Northern Forest Fire Laboratory involved in fire behavior and fire danger rating research. In 1965 he transferred to Fairbanks, Alaska, where he was Project Leader of the Alaska Fire Control Systems research unit. Following this assignment he returned to the Northern Forest Fire Laboratory where he is currently Team Leader of the Systems Development Team in the Fire-in-Multiple-Use Research, Development, and Application Program.

RESEARCH SUMMARY

Three questions regarding fire research needs were given to 355 respondents at 68 western Forest Service locations. Responses were categorized and summarized.

The inital question was "What kind of systems and support should research provide to help you integrate fire into land use planning?" Answers were processed into 12 categories, which were then ranked on the basis of frequency of response. Rankings of the top five or six categories were almost identical. Managers responding to this question mainly want better communication with researchers and improved transfer of research technology to management activities. State-of-the-art and "how-to" publications were thought important means of conveying information.

The second-ranked category included the need for economic evaluations, benefit-cost ratios, tradeoff and alternative evaluations, and value systems. Essentially all the responses in this category were economically oriented, indicating the current need to justify management decisions. Interest was strong in prescribed burning, fire use, and smoke management; and ranked third out of the 12 categories. Management practices ranked fourth. Here interviewees stated that they wanted better over-all guidance, more direction, and more detail in their land management planning activities. Fire effects and the effects of fire control ranked fifth. Respondents indicated a need to understand more thoroughly the effects of fire including the primary, secondary, direct, and indirect impact. The sixth ranked category dealt with the fire management activities of fire control and included fire behavior, fire danger rating needs. Managers wanted clarification of the relationship between land use planning and fire management planning and further indicated that tools and processes were needed to tie fire management planning more closely to the total resource planning process. Information, storage, and retrieval systems made up the seventh ranked category. Respondents felt that an information system should be affordable and usable by the local practitioners, rather than requiring special personnel.

Category eight included fuel prediction, inventory procedures, or in general, fuel management. Basically, managers wanted to know how to manage fuels--specifically what must be considered, including nutrient cycling.

The ninth-ranked category dealt with the need to obtain feedback and evaluation in the review processes between research and management. This would update information for managers and outline management's needs.

The tenth-ranked category was closely allied to the information and retrieval systems category previously mentioned, and was concerned with computer hardware and software, and analysis and display procedures. Field personnel expressed a need for use of computers to assist them in their management activities in all areas.

Category eleven covered hazard evaluation and fire probabilities. One specific question was: Can we predict the increase in hazard resulting from management activities? Is the magnitude of the increase predictable, can guidelines be developed to assist in making these predictions?

The twelfth and last category dealth with fire ecology. Managers need a means for defining succession following fires of various intensities based on prefire vegetative classification systems.

The second question asked in the survey was: What kind of accuracy and resolution do you need now, what would you like eventually? Most respondents felt that any improvements over today's capabilities would be helpful. They indicated that 99 percent accuracy was not needed and perhaps not attained.

The third and last question was: "When the RD&A is developing processes and procedures, would you have time to respond and to provide input?" do you want to be involved? Response to all questions was, "Yes".

Results obtained in this study provided additional guidance for defining and setting priorities for wildfire-related research in the western regions of the Forest Service.

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INTRODUCTION

In August 1973, the USDA Forest Service established the *Fire in Multiple-Use-Management Research, Development, and Application Program* (RD&A).[1] Development of this program was one response to the reality that the Forest Service, like other agencies in the public land management, is moving toward a policy in which fire, under careful controls, will be used to support forest and rangeland ecosystems management programs.

A study initiated in 1975 was directed toward one program goal, to develop methods for incorporating fire management into land-management plans.[2] This study was based on a sample taken from throughout the western regions of the National Forest System. Contacts were made in each regional office and selected forest headquarters and ranger districts in each of these regions. At each organizational level, personnel in fire management, land-use planning, timber, range, watershed, wildlife, recreation management, and State and Private Forestry were contacted.

Upon completion, results were analyzed then summarized and categorized. Results provided guidance for the RD&A program and development and modifications of planning procedures that include fire management considerations. An important result has been to more precisely define problems and to provide the RD&A program with specific direction.

This report discusses fire-related research needs in the western regions of the Forest Service. These needs were expressed by personnel at all management levels. Responses were one part of a more general study designed to establish information requirements for integrating fire into land management planning.

Researchers and managers alike need aids and good information in making management decisions that affect land use-fire management planning; no procedures or systems can be designed to adequately satisfy user needs without a thorough understanding of these needs.[3]

NEEDS ANALYSIS

Three questions were asked of all respondents:

1. What systems and support should research provide to help you integrate fire into land-use planning?

2. What degree of accuracy and resolution do you need now? In the future?

3. When the RD&A is developing processes and procedures, would you have the time to respond and provide inputs? Do you want to be involved? How much?

Responses were noted and tape recorded and subsequently categorized and summarized.

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[1]U.S. Department of Agriculture, Forest Service. 1973. Fire in multiple use management. Research development and application program charter. U.S. Dep. Agric. For. Serv., Intermt. For. and Range Exp. Stn., Ogden, Utah.

[2]Barney, Richard J. 1976. Land use planning--fire management relationships and needs in the U.S. Forest Service. Ph.D. Diss., Mich. State Univ. 244 p.

[3]Gerlach, Fredick L. 1974. An examination of forest fire control information systems and remote sensing application. Final Rep. (Draft) Univ. Mont., Missoula, 79 p.

SAMPLE SIZE

Management functions at each organizational level were sampled, using at least one respondent, as manpower availability permitted. Twenty percent of all national forest headquarters were sampled randomly. Ten percent of all the ranger districts were sampled randomly on a national basis. A minimum sample was one interviewee regardless of function per sample category and all available respondents were utilized. Appendixes A and B list locations selected. The sample was then reduced to include only the western regions, forests, and districts, including Alaska.

Sample Description

Participants.--Sixty-eight locations were visited, including 7 regional headquarters, 15 forest headquarters, and 46 ranger districts. In each of the regions, sample stops ranged from a low of 2 in Region 10 and a high of 14 in Region 4. The number of individuals encountered at any one of these stops ranged from 1 respondent on a small ranger district, to 14 respondents at a regional and a forest headquarters. General distributions by region for various sample attributes are shown in table 1. The number of respondents per stop averaged from 3.8 to 8.5 by region. The average for personnel per stop for the entire study was 5.2 individuals. A total of 355 respondents were interviewed at the 68 locations visited.

Geographic distribution.--Based on the land area in each region, the overall acres per stop was about 2 million acres, with some variation for Regions 5 and 10. By-and-large, however, the distribution based on land ownership appeared to be representative.

Table 1.--*Region size and sample relationships*

Region	Acreage[1]	Sample[2] stops	Acres per stop	Personnel contacted	Average personnel per stop	Personnel contacted (percent of totals)
1	26,138,941	10	2,613,894	47	4.7	13
2	21,936,820	9	2,437,424	34	3.8	10
3	20,756,119	10	2,075,612	60	6.0	17
4	31,125,801	14	2,223,271	61	4.3	17
5	19,437,988	13	1,495,229	89	6.8	25
6	23,344,264	10	2,334,426	47	4.7	13
10	20,715,704	2	10,357,852	17	8.5	5
Total or average		68	--	355	5.2	100

[1]USDA Forest Service. 1974. National Forest System areas as of June 30, 1974. U.S. Gov. Printing Office, Washington, D. C., 38 p.
[2]For detailed locations see Appendixes A and B.

The spatial distribution of the random sample also appeared to be representative. Figure 1 illustrates the sample stops and their distribution within each region. The sample did give a good geographical distribution within each region and throughout the ownership pattern; coverage was good both east and west, and north and south. Districts with both heavy and light timber and range workloads were surveyed.

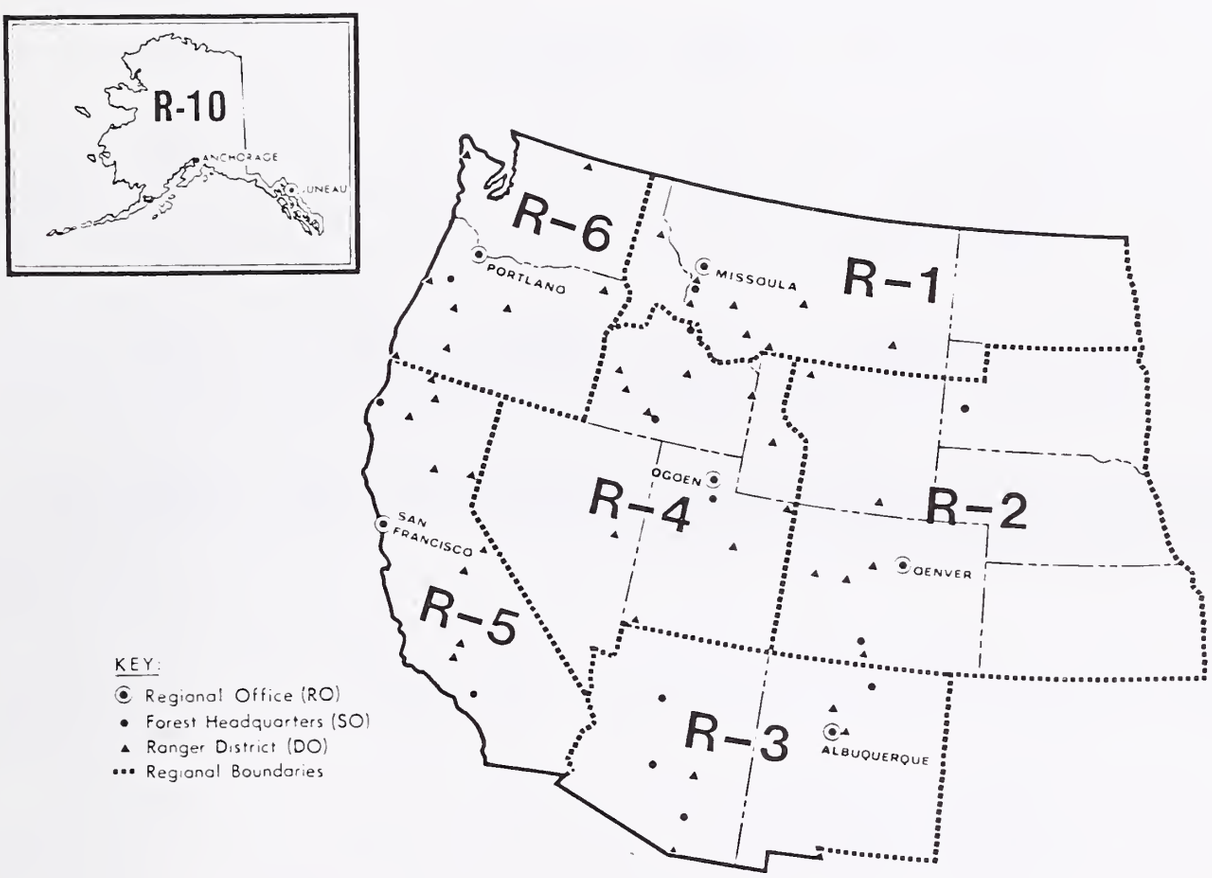

Figure 1.--Locations of managment interviews.

Respondent characteristics.--Respondents constituted a cross section of Forest Service personnel. Because this part of the study was dependent upon personnel availability and interest, result were gratifying. The distribution of positions was representative not only of total numbers, but also of each organizational level (table 2). Fire management might be overrepresented; however, because this was a fire and land-use planning study, this was expected.

Table 2.--*Summary of respondent characteristics by organizational level*

Characteristics	Level			Total
	Regional office	Forest office	District office	
Position				
Supervisor or ranger	0	9	42	50
Timber	7	13	36	56
Water	6	9	0	15
Range	3	9	21	33
Recreation	5	8	15	28
Wildlife	5	7	3	15
Fire management	13	16	40	69
Planning	8	14	5	27
State and Private Forestry	6	0	0	6
Other	6	23	23	52
Service time (average)	20.8	15.1	13.8	15.4
Position time (average)	3.9	4.3	4.2	4.1
Education (average)	16.5	16.2	15.2	15.7

Table 3 lists individuals who listed current position as "Other." Some of the respondents could have selected existing categories, but they were allowed to list themselves as they wished.

Table 3.--*Respondent positions specified in the category "other"*

Specified position	Number
Adminstrative officer	1
Botanist	1
Deputy forest supervisor	2
Development forester	1
Drafting/planning	1
Ecologist	1
Engineer	8
Environment services	1
Fuel management specialist	1
Information and education	1
Lands	7
Landscape architect	5
Minerals	1
Plans and other resources	1
Public information officer	2
Recreation and lands	1
Resource forester	8
Silviculturist	1
Soil scientist	4
Technician	2
Total	50[1]

[1]Discrepancies in totals are a result of improperly completed form headings.

Average service time and time in current position were generally similar for each region. The time in service increased with the organizational level, as expected. Educational level also rises with the level in the organizational hierarchy. Fire management personnel were compared with others using all data. In this case, the service time and position time went up slightly for fire personnel. Educational levels were lower for fire control personnel. Such a response was expected since many fire management specialists have worked their way up in the organization through the technician rather than the professional career ladder.

The overall sample provides not only a geographically well-distributed grouping, but also a very satisfactory internal-position representation. It would be difficult to make many improvements at the same sampling intensity.

PLANNING NEEDS

The initial question was: "What kinds of systems and support should research provide to help you integrate fire into land-use planning?" The following summary ranks, in order of frequency, responses falling into one of 12 categories. Differences between the top five and six groups are quite small, however, and perhaps should be considered of equal importance.

Category 1.--Communications and Technology Transfer. The responses repeated most often include state-of-the-art publications, "how to" material, and on-the-ground consultations. The "how to" publication that would guide personnel at all levels through specific steps was of general interest.

Although some state-of-the-art publications have been developed, respondents were concerned about the length and breadth of these documents. Many respondents thought that these publications should be much simpler or else include a summary that would highlight the key findings. There also was a desire to have researchers' comments on the accuracy and applicability of information.

A need for on-the-ground consultation with researchers was indicated. This includes field observations and assistance by subject-matter specialists. Field personnel suggested that research would be more relevant if researchers spent more time in the field.

Respondents want to know the current status of research underway at the various research facilities throughout the country and when results will be available.

Category 2.--Economic evaluation, benefit-cost ratios, trade-offs, alternative evaluations, value system. Most responses in this category were prompted by the need to develop, maintain, and defend benefit-cost ratios of fire-related management activities, including slash disposal, fire control, and fuel management. Part of this request was undoubtly tied to NEPA and RPA; however, there was a strong desire for assistance to develop alternatives, evaluate them, and defend the eventual choice. Field personnel wanted to be able to determine odds for the success of different management strategies, various trade-offs, values that might be foregone, and benefit-cost values. Field personnel want better systems to determine values of the various resources and management activities.

The necessity for and level of fire control activities undertaken in certain situations was questioned. Personnel want benefit-cost and trade-off information to justify not taking aggressive suppression action in some situations.

Category 3.--Prescribed burning, fire use, smoke management. There is strong interest in using fire in management activities in the western regions. There is a need to know how to prepare specific prescriptions for vegetative manipulation to meet management objectives. There is a need for procedures to evaluate prescribed burning and determine if the objectives were met. Potential applications for prescribed burning are broad, ranging from understory burning and type conversion to range enhancement and management.

In every region visited, there was keen interest in using fire as a management tool. Some of the reluctance to do so evolved from a lack of confidence in meeting objectives. There seemed to be more confidence in the ability to keep fires within certain designated boundaries; respondents believed, however, that they should be able to manage resources using fire in a broader context than hazard reduction. In areas where air pollution is an issue, questions were raised about smoke and smoke management. If managers are to continue using fire and increase its use, they must be able to manage smoke.

Use and application of fire in all aspects of management needs to be explored. Basically, respondents want information on the entire array of fire management potentials including smoke management. Apparently, managers in the West are eager to use fire for purposes other than hazard reduction.

Category 4.--Management practices, fire-related ecosystems, trade-off relationships. Although category 4 is a "catchall," some very important concerns were voiced by all levels of the organization. For example, respondents wanted better guidance. They wanted more direction on how much detail is needed for the various land-use planning levels. They need clarification of the relationship between land-use planning and fire management. More basic, however, was the need to clarify the objectives of land-use planning itself. People at all levels indicated the need for better direction on land-use planning from the top down, particularly organizational objectives. There is a need to clarify policy and direction regarding fire and its role in the planning system. Respondents want more uniformity of planning systems and procedures.

Many other management-related problems were put in this category, including how to get better technical support from staff specialists who must function as subject-matter experts and information needs can vary with management situations. What tolerances (losses) are acceptable for the various management activities? Evaluation procedures are needed for planning not only fire elements, but all elements, in terms of their role in the planning process. What are the impacts of resource development and fire activities? Other responses indicate the need for getting people to think of the system as a whole and not as fragments. Where is fire an appropriate management tool and where can we *not* tolerate it? We need alternatives to fire. We must be able to link silvicultural practices, logging prescriptions, and fire as well as other management activities. We need to know how much input from any activity is necessary to make management and allocation decisions. We must understand man's effect on the fire environment.

Category 5.--Fire effects, including control effects. This category is related to category 12; however, it is more specific.

Responses indicated a need to understand more thoroughly the effects of fire--primary, secondary, direct, and indirect. Respondents want to be able to evaluate not only the impact of a fire but also the potential or actual impact of fire suppression on the overall land-management objectives. There is a need to go beyond the first-level effects of fire and predict secondary and tertiary effects. There is a need to evaluate the effects of fire and also to evaluate the impacts of land-management activities on fire-management alternatives, using a universal scale and common language.

Because of legislative requirements, "fire effects" interpretations and predictions need to address potential changes in water quality relative to vegetation burned and intensity of burn. We need to know impacts or potential impacts on smoke and air quality. More specific information is needed on fire intensity/site productivity relationships. Managers also want to know the organism's activity, small animal populations, and their dynamics.

Projections of fire effects must not only be for a short term of 5 to 10 years, but extend further into the ecosystem rotation. Nutrient loss or gain, relative to multiple burns, must be explained along with an explanation and understanding of other physical site changes resulting from fire. Not only is it important to understand the effects of fire in specific ecosystems and site situations, we must also understand the effects of fire exclusion.

Category 6.--Fire management, fire control, fire behavior, fire danger rating, etc. Concerns ranged from how to improve presuppression, to the need for better application of the National Fire Danger Rating System. Respondents pointed out the need to determine and predict if protection can be provided for specific management alternatives. If protection can be provided, how can costs and effectiveness of the system be evaluated? There is a need to clarify the relationship between land-use planning and fire-management planning itself. Along this same line, the fire organization should respond positively to the land-use planning process.

Obviously, tools and processes are needed to tie fire-management planning more closely into the total resource planning process. Personnel must be trained to insure that fire-management concepts are understood.

Fire protection, prevention, and the social impact of fire were identified as areas of weakness. More specifically, managers want to know how fire can become accepted as a management tool in the Western United States to the same degree that it has been accepted in the South and Southeast. Managers want a simple checklist for land-use planning and how fire fits into alternatives so that important items are not to be left out of plans.

Category 7.--Information storage and retrieval systems and data. Interest in information storage and retrieval systems ranged from general and research literature to very specific, site-compartment data on fire history, vegetative typing, wildlife inventories, timber inventories, and so on, for making management decisions. Information and retrieval systems should be computerized. The data base should also be set up with nationwide standards to insure commonality among Forest Service regions. Information and retrieval should be affordable and usable by local practitioners without hiring data systems specialists. Respondents indicated that a catalog or a summary of information and retrieval systems presently available and accessible would be worthwhile.

Category 8.--Fuel prediction and inventory procedures, fuel management. The eighth category did not rank as high as anticipated, considering current Service-wide emphasis on fuel management. Basically all levels in the western regions wanted to know how to go about fuels management. How do we classify fuels? Respondents indicated a need for nutrient-cycling information related to various aspects of fuel management. They indicated a need for information on the effects of various fuel reductions in ecosystems on small-mammal populations.

Managers want researchers to develop simpler methods to measure and evaluate fuels. They need to predict additional fuel loads resulting from management activities. Photo keys or similar method were mentioned as possibilities. Fuel-loading additions must also be related to fire potential on the given site. The economics of fuel management were also mentioned. Respondents wanted information on the relationship between fuel increases and changes in hazard and risk. Can a system be developed so that fuel information and other resource inventory data are gathered at the same time?

Category 9.--Feedback, evaluation, review procedures, and processes. Respondents expressed a strong need to know what research is in progress. There is a need for periodic updates of material; respondents were generally unaware of research activities until published results appeared. Respondents at all management levels wanted more input in the planning and development of research projects. This concern was particularly apparent at the ranger district level.

Respondents wanted to know if new research-developed procedures really worked and, if so, how well and what were some of the ramifications of implementing them in the field. The implication seems to be that research leaves the job once the results are published and does not follow through to see if modifications are necessary. There was strong support to tie research to field activities and problems. There was a definite criticism of research that is not problem oriented.

The need to get research results on the ground was emphasized. Suggestions included simple 1- and 2- page summary publications, training programs, semminars, and on-the-ground consultations. One individual requested a national list of Forest Service researchers, as well as an area list, with notations of the scientist's specialty. The list would assist field personnel in contacting researchers for help in answering questions on specific publications of field problems. There is an obvious, overriding need to improve communication between the researchers and the practitioner to minimize doubt, distrust, and lack of communication.

Category 10.--Computer hardware, software, analysis, and display procedures. This category is closely allied with information and retrieval systems. Field personnel expressed strong interest in the use of computer software to assist them in management activities. Here, as in the previous category, there is need for catalogs of available computer programs with commentary as to the availability, types of data required, input-output costs, reliability, etc. Many voiced the concern that often the available computer material is too costly for normal operations and that office calculations (using desk-top calculators and computers) could be done in less time than some of the computerized operations.

Respondents were interested in computerized procedures for land-use planning and fire management input. Computer systems must be usable by field personnel. Respondents recognize that the analysis-display capabilities of the computer would be helpful in evaluating management alternatives. They generally agree that computerized planning procedures are here and will be indispensible in the near future.

Category 11.--Hazard evaluation, fire probabilities. This category received minor attention compared to the others. Nevertheless, a need was expressed to determine how to measure existing hazard, much of which involves fuels produced from management activities. How do you determine "moderate resistance to control"? In a given management situation, is slash going to be a problem; if so, how much and for how long? What are the probabilities of fire occurring in slash versus nonslash areas? How can we identify hazard levels and how can we determine what effect they will have on our ability to meet management objectives?

Can we predict an increased hazard resulting from management activities? Is the magnitude of increase predictible? Can guidelines be developed to assist in making these predictions? A strong voice was raised for arriving at a standard for "living with fire." For example, de we treat slash, or under what conditions can we assume the risks if it is left untreated? All these issues center around the necessity to evaluate hazard and establish probabilities of fire occurrence.

Category 12.--The role of fire, fire ecology. The demand for specific information in fire ecology had the lowest priority. Perhaps field personnel believe they have a general understanding of the ecological situation.

Respondents showed interest in obtaining specific information on fire ecology and the role of fire in various ecosystems. Some individuals wanted to know how they might maintain various vegetative types by periodic burning. Respondents expressed a need to understand the role of fire in the various management systems at their disposal. A specific need was voiced by individuals in the Intermountain Region for a better definition of succession following fire, based on prefire habitat types and prefire land types. In this general area, a need was expressed to relate fire intensity and the probability of the type od succession expected.

ACCURACY REQUIREMENTS

The second question asked was: "What degree of accuracy and resolution do you need now? What accuracy would you like eventually?" The first question proved difficult to answer, the second question even more so. The major point made by respondents at all levels was that any improvement in accuracy over what we have today would be helpful. Respondents indicated that the 99 percent accuracy the researcher often wants is well beyond their needs and their ability to utilize in the field.

The district level response varied between 51 percent up to 99 percent for special situations; but the majority said that 60 to 80 percent accuracy would be well ahead of where they are now. Respondents realized that accuracy requirements are site-specific and would vary with the situation. Some areas and some conditions require much more accuracy or probability of success than others. The general "forgiveness" of many of the ecosystems being manipulated in our management practices helps cover up some of the low-accuracy applications. Respondents seem to be saying that improving success by 5 or 10 percent would be a giant step forward. Eventually, of course, they would like to make more decisions with a greater probability of success. However, they are well aware of the fact that they will continue to make decisions regardless of whether or not there is more research information.

The need to keep resolution levels in pace with the intended application was indicated. Respondents are more than willing to accept first-approximation information that might come from "quick-and-dirty" studies. They do want some indication of how accurate and how applicable the information is and what the chances for success are in a specific situation. They believe that it is their job to determine what to do from that point forward because they, not the researchers, are responsible for the land. Respondents also believe that once they begin refining management objectives, the need for more specific and precise information becomes apparent.

In summary, field personnel say they need to get existing information into the system. They need to be professional enough to extend that information as far as their expertise will allow for the situation at hand. They will tell research when they need more specific information. They will indicate when they cannot do something because the information is not adequate. They do, however, need some idea of the reliability of the information. They would like to have some indication of how far the information can be extrapolated for the situation at hand.

REVIEW, RESPONSE, AND LITERATURE

The final question was: "When the RD&A program is developing processes and procedures, would you have time to respond and provide input? Do you want to be involved? How much?" All interviewees said they must keep abreast with what research is doing.

They must participate and criticize. The only reservations concerned time and the need to limit inputs to a few pointed remarks. If asked to review materials, respondents felt they could provide marginal notes and some assessment, but not in-depth reviews. This was one of the important outcomes of the study. It illustrated that we have not fully utilized this intensity. Respondents sincerely believed that they had an obligation to respond. In short, the answer to the basic question was an unequivoca "Yes, we want to be involved and we will be involved as much as our other tasks allow us to be."

SUMMARY

The question asked all respondents concerning their needs for integrating fire into land-use planning evoked a wide array of responses. Because of the breadth of responses, it was necessary to group them into 12 categories, ranging from state-of-the-art and "how to" papers and consultations to the desire for feedback, evaluations, and review mechanisms. Throughout the entire sample, many of the responses were repeated. The compilation provides an indicator for future research direction. These responses also help sharpen the focus on current research and management.

The broad category of communications and technology transfer rated high as a need to integrate fire management into the land-use planning process. Basic methods suggested included state-of-the-art papers, "how to" publications, and on-the-ground consultation. Economics, benefit-cost ratios, trade-off procedures, and value systems comprised the second most important need. The major concern centered around the need to develop, maintain, and defend benefit-cost ratio material of fire-related management activities. Third, the use and application of fire in all aspects of management activities needs to be broadened and explored. Some of the more specific concerns include prescription preparation and execution, smoke management, and postfire evaluation. Under the fourth-ranked category (management practices...) personnel wanted better overall guidance from the top down, including more specific process advice and clarification of land-use planning objectives. In the fifth-ranked position, fire effects, quantification became important. Broad-based needs were expressed to put values on fire effects (good or bad) and on the effects of fire control action.

Based on the study results, it appears more specific direction is warranted. Processes for getting the job done must be developed and spelled out for general use. A strong, universal data base is also a must. Training in planning philosophy and process would go a long way toward resolving some of the questions raised. Much is known and can be brought to bear on the issues, but technology transfer mechanisms must be developed, improved, and implemented. Field personnel must also be better able to define the problems, not the symptoms for research.

Replies to what kinds of accuracy and resolution are needed now and in the future also evoked a range of answers. The major point made was that any improvement in accuracy would be helpful. Accuracy requirements would necessarily have to be site and situation specific. Respondents need information now but would like some measure of its applicability. How far can it be extrapolated; what are the probabilities of success of failure?

All respondents indicated a desire to become involved in the development of procedures for the RD&A program. They feel obligated to respond, contingent upon time available and interest in the specific topic.

As a direct result of this study, a wide audience in the Forest Service now has a clearer understanding of the purpose, scope, and intent of the RD&A Program. More than 300 field personnel have come face-to-face with research on a current, pressing, and practical issue. These meetings provided important communication and feedback for both sides. Finally, universal commitment to help review RD&A material provides widespread and representative contact with fieldmen.

APPENDIX A:
REGIONS AND FORESTS SELECTED FOR INTERVIEWS

APPENDIX A

Regions and Forests Selected for Interviews

Regions	Natural Forests
1	Bitterroot*
2	Black Hills Rio Grande*
3	Carson Cibola* Coronado* Kaibab Tonto
4	Salmon Sawtooth Wasatch
5	Angeles Six Rivers
6	Siuslaw*
10	Chugach

*Indicates one or more districts on the forest also were sampled.

APPENDIX B:
RANGER DISTRICTS SELECTED FOR INTERVIEWS

APPENDIX B

Ranger Districts Selected for Interviews

Regions	National Forests	Ranger Districts
1	Beaverhead	Madison
	Bitterroot*	Stevensville
		West Fork
	Custer	Fort Howes
	Deerlodge	Butte
	Gallatin	Gardiner
	Idaho Panhandle	Wallace
	Lewis and Clark	Musselshell
2	Grand Mesa-Uncompahgre	Collbran
	Medicine Bow	Centennial
	Rio Grande*	Conejos
	Shoshone	Wapiti
	White River	Aspen
		Dillon
3	Cibola*	Sandia
	Coronado*	Nogales
	Santa Fe	Jemez
	Tonto*	Globe
4	Ashley	Flaming Gorge
	Boise	Lowman
		Mountain Home
	Bridger-Teton	Big Piney
	Challis	Lost River
	Dixie	Pine Valley
	Humboldt	Ely
		Jarbridge
	Manti-LaSal	Price
	Targhee	Teton Basin
5	Inyo	Mono Lake
	Klamath	Oak Knoll
	Los Padres	Mt. Pinos
	Plumas	Oroville
	Sequoia	Greenhorn
	Shasta-Trinity	Yolla Bolla
		Weaverville
		Sacramento
	Sierra	Minarets
	Tahoe	Sierraville
6	Ochoco	Big Summit
	Okanogan	Tonasket
	Olympic	Soleduck
	Rogue River	Prospect
	Siskiyou	Chetco
	Siuslaw*	Waldport
	Wallow-Whitman	Bear-Sleds
	Willamette	Lowell
10	None	

*Indicates the forest headquarters was also sampled.

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Headquarters for the Intermountain Forest and Range Experiment Station are in Ogden, Utah. Field programs and research work units are maintained in:

Billings, Montana
Boise, Idaho
Bozeman, Montana (in cooperation with Montana State University)
Logan, Utah (in cooperation with Utah State University)
Missoula, Montana (in cooperation with University of Montana)
Moscow, Idaho (in cooperation with the University of Idaho)
Provo, Utah (in cooperation with Brigham Young University)
Reno, Nevada (in cooperation with the University of Nevada)